

# Popular Electronics®

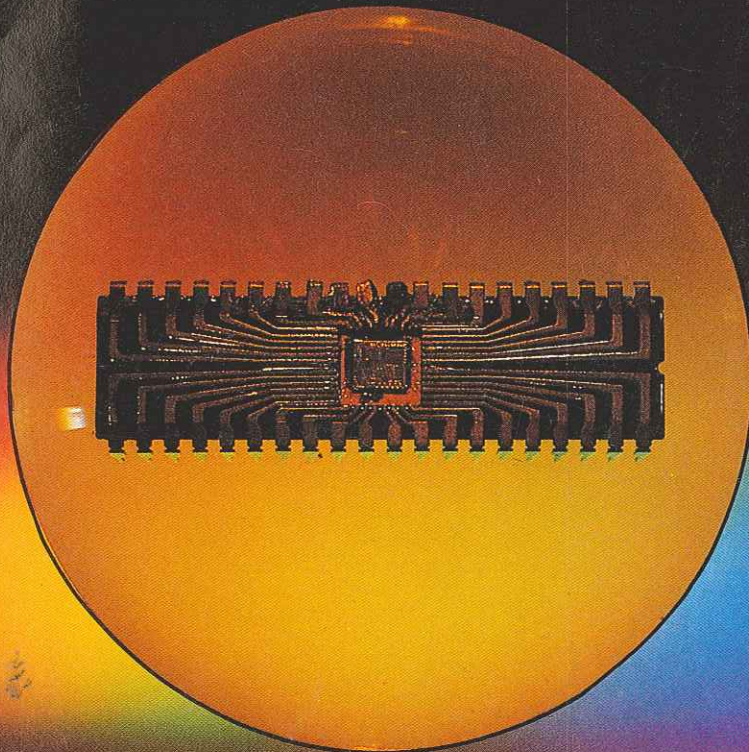
WORLD'S LARGEST SELLING ELECTRONICS MAGAZINE SEPTEMBER 1981/\$1

**For Home Safety: A Toxic Gas Alarm**

**For Realistic Music: An Audio Peak Extender**

**For Better Circuits: VMOS Power Devices**

## New Ways to Use 8080 Microprocessors

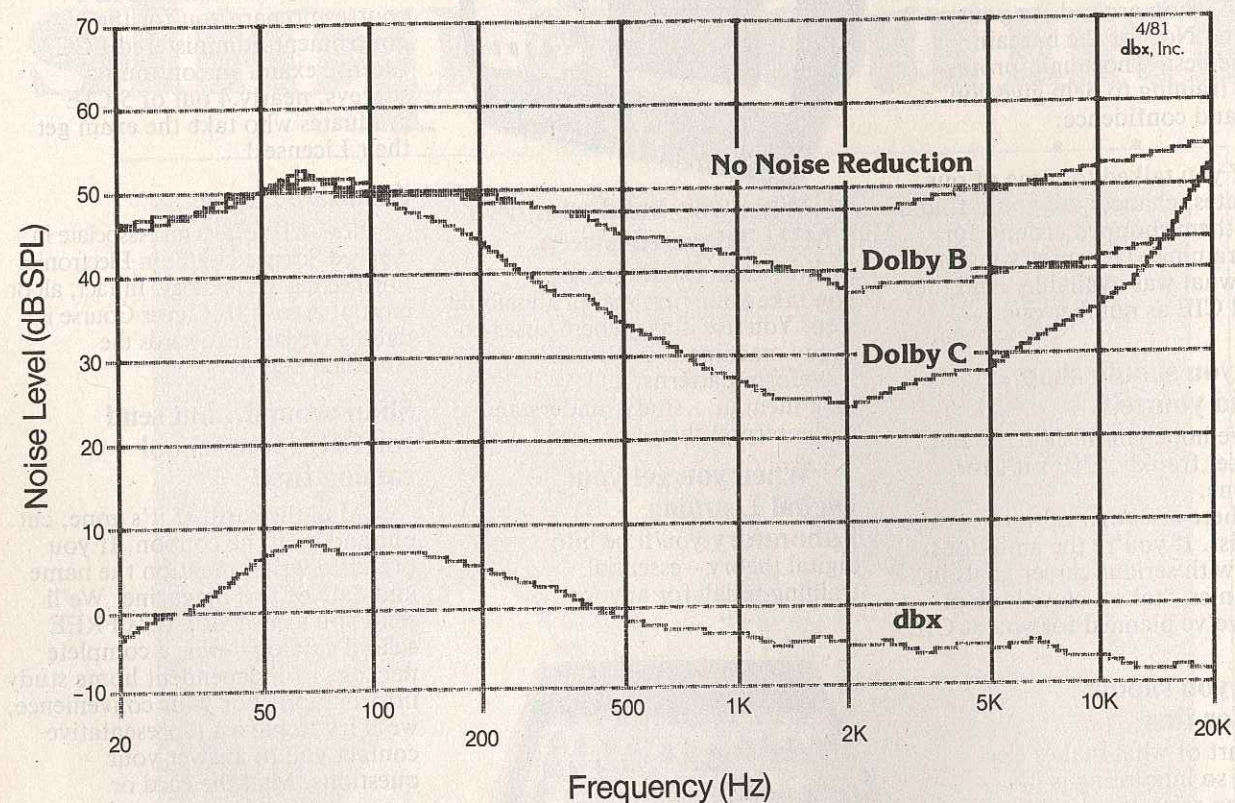


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### Featured in this Issue:

gram 8000 Turntable  
le II Plus Personal Computer

## dbx has been silent too long.



Noise from biased Chromium Dioxide cassette tape, comparing Dolby and dbx noise reduction systems. One third octave analysis. Tape noise level referenced to 200 nWb/m = 110dB SPL.

For years Dolby\* has been trying to reduce tape noise.

First came Dolby B. Then Dolby HX. Now there's Dolby C.

At dbx, we think it's time to set the record straight. You see, we've never tried to reduce tape noise. We've never had to.

Because from the beginning, dbx has done what Dolby keeps trying to do: eliminate tape noise.

Just compare Dolby's latest attempt with dbx.

Where Dolby C reaches a maximum noise reduction of 20 dB, dbx reaches 50 dB. In a CCIR-weighted noise measurement analysis, Dolby C manages only 18 dB, while dbx achieves 55 dB.

What do these numbers actually mean?

dbx\* is a registered trademark of dbx, Inc.  
\*Dolby\* is a registered trademark of Dolby Laboratories, Inc.

Simply this. When you push the Dolby C button, tape noise decreases. When you push the dbx button, tape noise disappears. (You can perform this test yourself using any blank cassette tape.)

The dbx system reduces tape noise so effectively, that it's beneath the noise floor of even the quietest living rooms. Unlike Dolby C, dbx is effective in more than just the mid-range. It operates across the entire frequency spectrum. There's no low-frequency noise. No high-frequency noise. No noise, period.

No wonder Technics, Onkyo, Yamaha, TEAC and others have designed their newest generation of tape decks with dbx.

There's more to this story, too. With the dbx tape noise reduction system, you're also equipped to play the widely acclaimed dbx Discs, the world's only Full Dynamic Range Records — and the first discs that eliminate record surface noise.

In addition, when digital playback technology finally arrives, dbx is the only system that will faithfully reproduce that sound on tape. You'll even be able to hear the sound of digital in your car, because we've developed a dbx decoding system for car stereo.

So before you rush out to buy a tape deck with Dolby C, we have a suggestion.

Listen to the new tape decks with dbx. Or hear what a dbx Model 222 or 224 can do for your existing system.

At dbx, we've been silent too long.

The fact is, Dolby just reduces noise.

dbx eliminates it.

**dbx**

dbx, Incorporated, 71 Chapel Street, Newton, Mass. 02195 U.S.A.  
Tel. (617) 964-3210. Telex 92-2522. Distributed throughout Canada by BSR (Canada) Ltd., Rexdale, Ontario.

CIRCLE NO. 74 ON FREE INFORMATION CARD

POPULAR ELECTRONICS

## Popular Electronics Tests



### The Apple II Plus Personal Computer System

**A**LTHOUGH it is not a new entry to the world of personal computers, the Apple II Plus is by far one of the most flexible and powerful machines available. Based on the 6502 microprocessor and an 8-bit bidirectional bus with eight so-called peripheral slots, the system can accommodate a wide range of applications. Essentially, the Apple II Plus is an upgraded version of the Apple II, containing built-in Applesoft and with the Integer BASIC dropped.

As designed, the Apple II Plus can operate with either a conventional TV receiver or a video monitor. When used with the former, the system needs an r-f modulator that meets FCC requirements. Performance is good either way, but the monitor is the best choice when color of very high quality is required.

The computer's enclosure is compact enough to be easily portable, and has a pleasing color. Other accessories, such as the video monitor, disks and printers, are onboard to the main unit. A carrying case, with pockets for cables, is provided for the main-frame section.

A basic Apple II Plus system with 16K bytes of RAM, ROM-resident Ap-

plesoft Extended BASIC, Auto-Start ROM, disassembler, and reference manuals—of which there are many—is priced at \$1330. However, locating a 16K system may be difficult, as Apple has elected to provide only 48K systems (which cost \$1530) to distributors. This has caused retailers some consternation, but, in our opinion, an extra 32K bytes of RAM for \$200 represents a good buy.

The configuration that we used for our evaluation consisted of:

Apple II Plus with 48K RAM and all standard features.....	\$1,530
Disks II, a 16-sector 5.25-inch single-density floppy with interface and DOS 3.3 .....	645
Second disk drive.....	525
12-inch monochrome Sanyo monitor .....	320
Silentype printer with Apple II interface.....	635
Language System with Apple Pascal .....	495
SSM Microcomputer Products AIO serial and parallel Apple interface.....	195
Microsoft RAMcard .....	195
Z-80 Softcard.....	349
	<b>\$4,919</b>

In addition to the above, Personal Software has made available: VisiCalc, Visidex, Visitrend/Visiplot, and Visiterm. Agent Computer Services provided the Buffered Modem program for testing the viability of communications, and Vista provided the Model-150 40-character keyboard buffer.

**General Description.** The Apple II Plus consists of a molded, high-impact plastic case that houses the 6502 CPU, a high-efficiency switching power supply with sufficient shielding to avoid EMI and RFI difficulties, a 52-key typewriter-style full-stroke keyboard, cassette recorder input and output jacks, and video display output jack. The system backplane contains eight peripheral slots.

The system keyboard sports 2-key rollover and four special-function keys: CTRL (control), ESC (escape), RESET (used to restart the system), and REPT (repeat—provides automatic repetition of a depressed key). The coding is upper-case ASCII. Lower case is omitted, but can be added by plugging in a PROM with a new character set.

(Continued on page 40)



ple, its attributes could then be requested and held in a system map file. Application programs could use this file by simply calling the device.

As described, we encountered no problems with heat or, for that matter, bus loading. But we noticed that it does become a tight fit when you start adding cards to the backplane; such is the price of ready portability. And speaking of portability, a card-restraint cage would be a nice touch, even at a slight cost.

**Comments.** The Apple is one of the most widely supported machines on the personal computer market today, with over 300 companies providing hardware, software or both. Additionally, numerous manufacturers see the machine as a low-cost entry to the high-end graphics marketplace.

Interestingly, though this may be strictly our perception, the audio aspect of the machine has not caught on. But this may be changing. According to some observers, sophisticated voice-output devices will make the machine downright conversational.

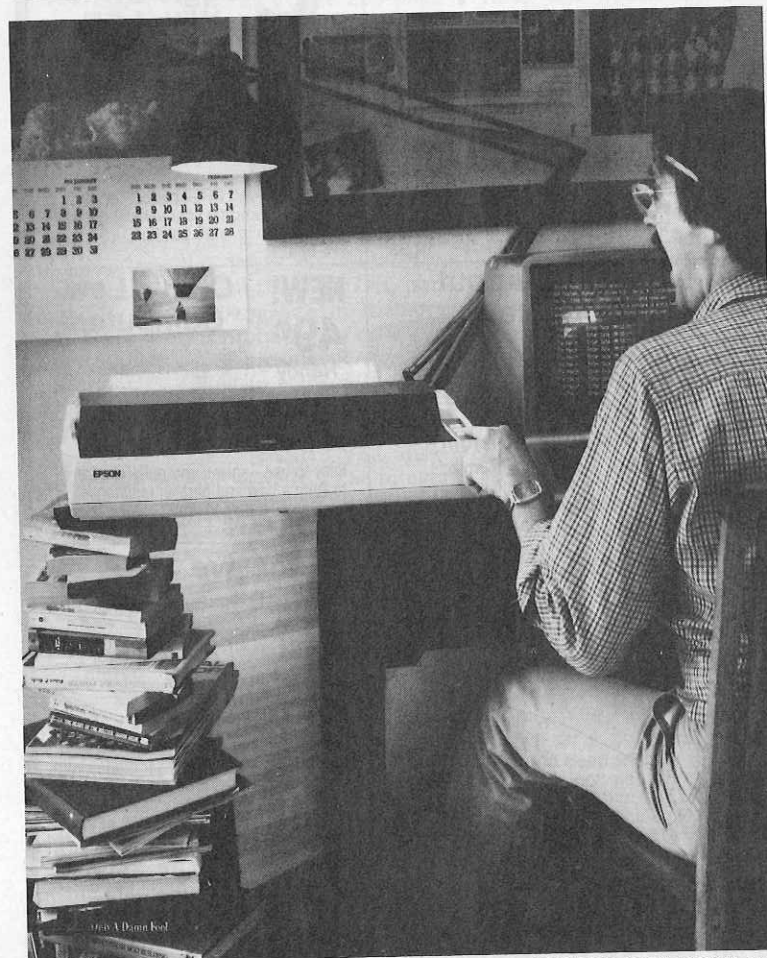
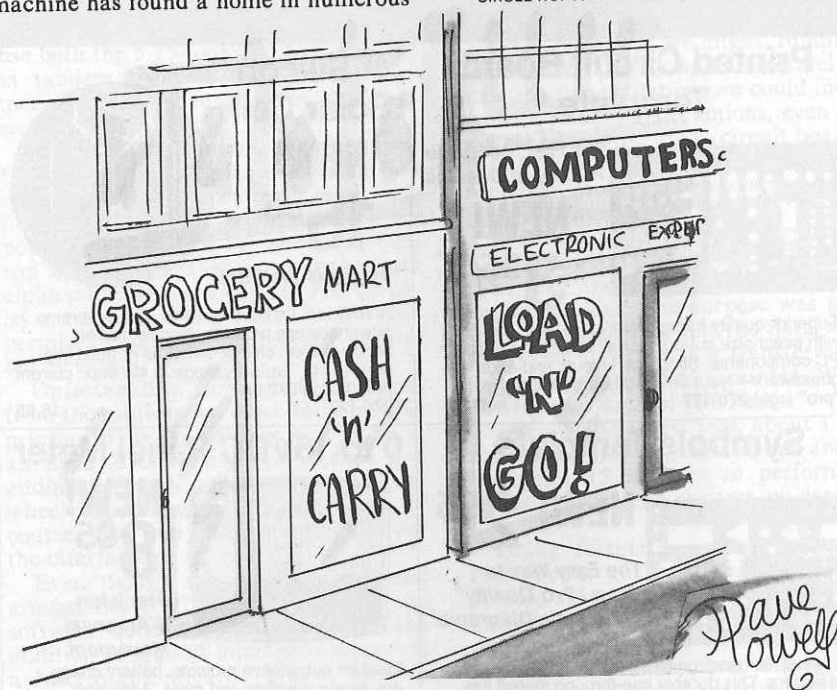
As far as we are concerned, the Apple II Plus gets high marks and has no serious shortcomings anywhere. But as capable as this machine is, we aren't convinced that it is ideal for business. We

do believe, however, that it fits well into environments requiring rapid data collection and into graphic arts. In fact, the machine has found a home in numerous

schools that use it for teaching everything from computer science to manufacturing skills.

—Carl Warren

CIRCLE NO. 102 ON FREE INFORMATION CARD



## The MX-100. Not just better. Bigger. Epson.

The new Epson MX-100 is a printer that must be seen to be believed.

For starters, we built in absolutely unmatched correspondence quality printing and a high resolution bit-image graphics capability. Then we added the ability to print up to 233 columns of information on 15.5" wide paper to give you the most incredible spread sheets you're ever likely to see. Finally, we topped it all off with both a satin-smooth friction feed platen and fully adjustable, removable tractors. And the list of standard features goes on and on and on.

Needless to say, the specs on this machine — and especially at under \$1000 — are practically unbelievable. But there's something about the MX-100 that goes far beyond just the specs. Mere words fail us. But when you see an MX-100, you'll know what we mean.

It's not only better... it's bigger.

**EPSON**  
EPSON AMERICA, INC.

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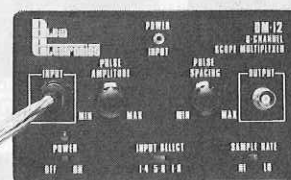
POPULAR ELECTRONICS

# ALBIA Electronics

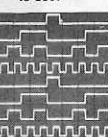
YOUR MAIL-ORDER ELECTRONIC SUPPLY HOUSE!

## 8 CHANNEL SCOPE MULTIPLEXER, DM-12

Convert your single channel scope into a 4 or 8 channel instrument; just connect the DM-12, 8 channel scope multiplexer to your scope, clip the 8 input probes to the signals you want to view. Simple, easy, fast — can handle logic level TTL signals from DC to 3MHz. Features separate spacing and trace amplitude controls and selectable sampling rate — all to insure easy clear scope display.



Completely assembled and tested! Ready to use!



VIEW 8 CHANNELS AT ONCE!

**\$69<sup>95</sup>**

## LOW COST CAPACITANCE METER MODULE, DM-8

Connect this high quality low cost Capacitance Meter Module, DM-8 to your digital Volt Meter and turn it into a Digital Capacitance Meter — the Low Cost Way!



Completely assembled and tested! Ready to use!

**\$69<sup>95</sup>**

## REGULATED TRIPLE POWER SUPPLY, LOW PRICED!, DM-6

A fully assembled and tested power supply that provides a solid, fully wired triple power supply including fixed 5V @ 1 Amp, 5V to 15V @ 0.5 Amp, and -5V to -15V @ 0.5 Amp — all supplies regulated, short proof. Each supply has short indicator LED. Complete and ready for use in a durable (8" x 6" x 1 1/2") metal case.

**\$99<sup>95</sup>**



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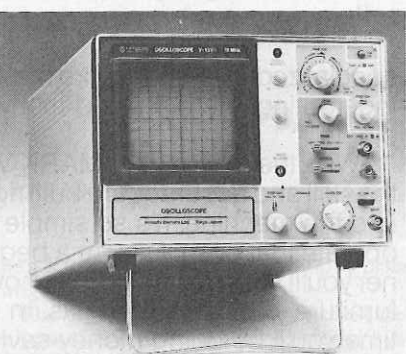
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## HITACHI DC-15MHZ SINGLE-TRACE PORTABLE OSCILLOSCOPE AT THIS LOW, LOW PRICE



- CRT Display area** 130BUB31 (5-inch, round shape) 8x10div (1 div = 9.5mm)
- Acceleration potential** Approx. 2kV
- Intensity modulation** Over 5Vp-p
- Vertical deflection Sensitivity and bandwidth** 5mV/div - 5V/div ± 5%, DC - 15MHz, -3dB 1mV/div - 1V/div ± 6%, DC - 5MHz Typ. - 3dB (Using x5 amplifier) 20Hz
- Rise time** More than 4div at 15MHz
- Dynamic range** Direct 1M Ohm, approx. 30pF
- Input R and C** 600Vp-p or 300V (DC + AC peak)
- Maximum input voltage** Single-trace DC - 500 kHz, 200mV/div
- Display mode** DC - 10kHz 3°
- X-Y operation** Phase difference DC - 10kHz 3°

- Horizontal deflection Sweep mode** Auto, NORM, TV (+), TV (-)
- TV synchronization** TV sync-separator circuit
- Internal** Over 1 div (V sync-signal)
- External** Over 1 Vp-p (V sync-signal)

Frequency	Internal	External
20Hz - 2MHz	0.5div	200mV
2 - 15MHz	1.5div	800mV

- Trigger slope** ±
- Sweep time** 0.2µs/div - 0.2s/div ± 5%, 19 calibrated steps
- Sweep-time magnifier** 10 times (± 7%)
- Max. sweep rate** 100ns/div

- Amplitude calibrator** 1kHz ± 10% Typ. Square wave
- Waveform** 0.5V ± 3%
- Voltage**

- Power requirements** 100V (120/220/240V) ± 10%
- Dimensions** 50/60Hz, 40W
- Weight** Approx. 275(W) x 190(H) x 400(D)mm
- Ambient operation temperature** Approx. 8.5kg
- Temperature** 0° - +40°C

## MODEL V-151B WITH 2 YEAR MFG. WARRANTY

**ONLY \$499<sup>95</sup>**

## WITH FREE DM-12 8 CHANNEL MULTIPLEXER

A COMBINED VALUE AT LIST OF \$639.95 YOU SAVE \$140.00

## LOW COST HIGH FREQUENCY COUNTER



### MODEL NO. DM-7

The Albia Model DM-7, 8 Digit High Frequency Counter is easy to use, switch selectable time base input by a single BNC, nothing to build!

- 5 Hz to 550 MHz
- 8 big easy-to-read .43" high intensity LED display
- Crystal (± 3 ppm @ 25°) controlled 0.1 or 1.0 sec. gate times
- Convenient benchtop size (7" x 10" x 3") durable attractive case

COMPLETELY ASSEMBLED PRE-CALIBRATED PRE-TESTED **\$149<sup>95</sup>**

## LOW OHM METER MODULE, DM-10

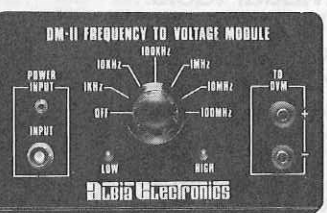


Measures resistance from 10 milliOhms to 20 Ohms. Now you can measure resistance down to 10 milliOhms with this low cost, easy to use DVM module. Check coil resistance, transformers, relays, chokes, printed circuit board copper paths and ground cables. Special zero balance control nulls out input cable resistance to insure accurate readings. Your DVM has to be set to 2V range during operation.

- Resistance range 10 milliOhms to 20 Ohms
- Zero Calibration control
- Battery powered (push to read battery saver circuit). Requires 1.9 Volt Battery (not included)
- Size 6.25" x 3.75" x 2" (Input cables not included or available)

**\$69<sup>95</sup>**

## FREQUENCY METER MODULE "5Hz to 100MHz", DM-11



Measure frequencies from 5Hz to 100MHz on your digital voltmeter with a resolution of 3 1/2 digits — easy to use — perfect for field service — lab testing — home hobbyist! Connect the DM-11 to your DVM, set the DVM to the 2VDC range, connect a signal to the DM-11 via a BNC cable (not included) and measure the frequency of any source. Hi Lo Range LED's insure fast accurate readings.

- Frequency Range 5Hz to 100MHz
- Input Impedance 1 MegOhm
- Input Sensitivity: < 100Hz < 80mV
- 100 Hz - 60MHz < 30mV
- > 60MHz < 70mV
- Size 6.25" x 3.75" x 2"
- External 9V DC power supply included. (Model MMAC-2)
- BNC Input Cable Accessory (Model PSA-2 add \$14.95)

**\$69<sup>95</sup>**

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ORDERS	ADD
UP TO \$10.00	\$1.95
\$10.01 - \$25.00	3.75
\$25.01 - \$50.00	4.65
\$50.01 - \$100.00	6.45
ORDERS OVER \$100.00 WITHIN UNITED STATES	7.55

FREE ALBIA DESIGNERS TEMPLATE WITH EVERY ORDER RECEIVED

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